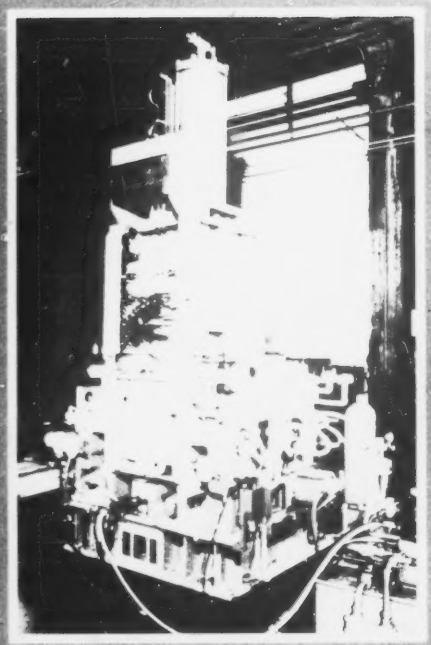
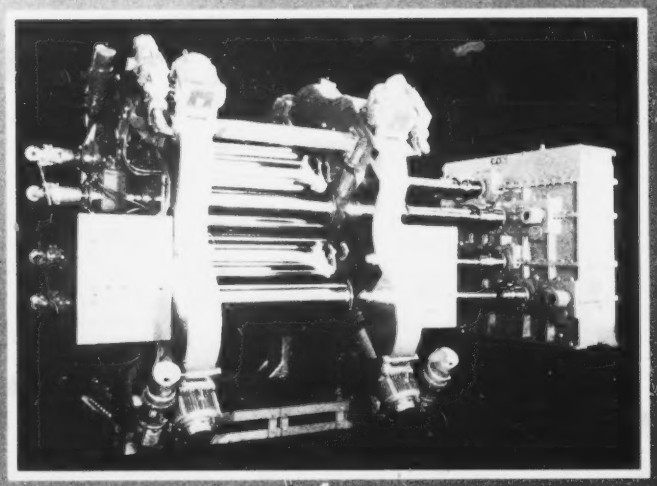
Rubber World

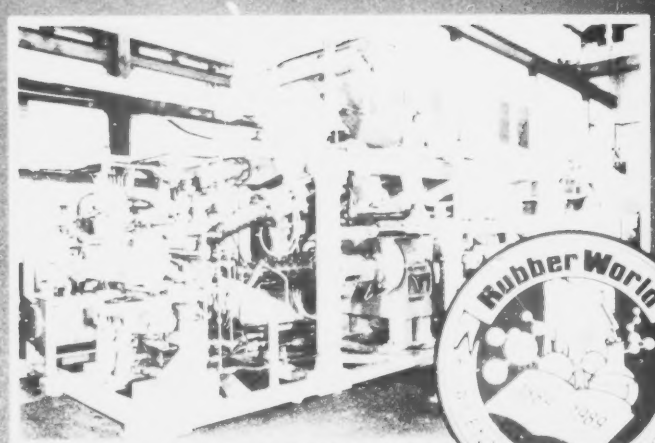
The Technical Service Magazine for the Rubber Industry Volume 200, No. 4 July 1989





Annual Machinery & Equipment Issue

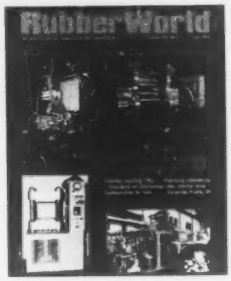
Injection molding TPEs — Improving calendering
Evaluating an intermeshing rotor internal mixer
Compounding for rolls — Corporate Profile '89



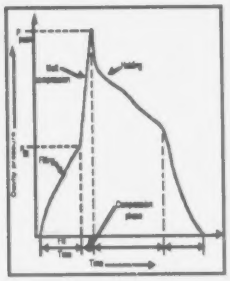
Rubber World
LINE OF COMMUNICATION

Contents

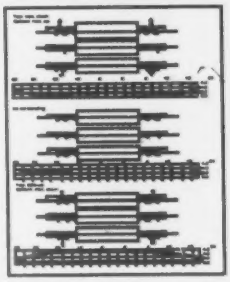
Vol. 200, No. 4/July 1989



Machinery & equipment



Injection molding TPEs
p. 14



Improving calendering operations p. 23

7 Business Briefs
Acquisitions, expansions; contracts, licenses; corporate, financial news; markets, news.

11 Patent News
edited by Bob Samples, Akron Rubber Development.

12 Tech Service: Predicting toughness
by Jon Menough, contributing technical service editor. This month's column reviews the paper "Dynamic and mechanical analysis of track pad elastomers before and after service," presented at last fall's Rubber Division meeting by John Vicic, FMC Corporate Development Center.

14 Injection molding thermoplastic elastomers
by John A. Hudson, Boston Scientific Corp. The author presents guidelines for injection molding styrenics, polyolefins, copolyesters, polyurethanes and polyamides.

18 Performance evaluation of an interlocking rotor internal mixer
by J. Batchelor, P.K. Freakley, S.N. Ghafouri and D.W. Southwart, Institute of Polymer Technology and Materials Engineering, Loughborough University, U.K. This article quantifies the influence of six process operation variables on the processability of a carbon black filled natural rubber compound and on mixer responses.

23 Improving calendering operations
by Don Bauman, Pathex, Inc. The author explains how calendered products manufactured can be improved with minimal changes and with correct maintenance and proper operation.

25 Compounding requirements and techniques for rubber covered rolls
by Thomas L. Jablonowski, Uniroyal Chemical Co. This article presents a review of compounding techniques for development of rubber compounds for roll applications, focusing primarily on EPDM and NBR polymers.

32 Machinery sales continue strong
A study of new rubber equipment suppliers is presented, along with results of RW's annual survey of used and rebuilt rubber equipment suppliers. Also included is a directory and a grid showing rebuilding capabilities.

82 Techno Mart
New equipment, instruments, CAD/CAM, products and materials

Departments

4	Editorial	78	Meetings	90	Literature
77	Calendar	89	Jobs & People	92	Ad Index

A Lippincott & Peto Publication

Editorial

The machinery and equipment segment of the rubber industry appears to be in good shape and if this is a true barometer, the industry as a whole must be increasing production. The sales of rubber processing and auxiliary machinery has always been a tough one to monitor. There isn't an industry association that keeps statistics and the government figures are incomplete and inconclusive because they aren't specific enough. For years we have surveyed this market from the sellers' - the new, used and rebuilt machinery suppliers, viewpoint and from the buyers' - the rubber product manufacturers, viewpoint.

This year's survey of the used and rebuilt machinery suppliers was the most positive ever. Of the 38 respondents, only one company indicated sales were off in 1988 compared to 1987 and only one company (not the same one) indicated that sales this year might not reach last year's mark. This coupled with a report from Business Trend Analysts on new machinery indicates that product manufacturers are investing in equipment. It looks like 1989 could be the third straight year of sales gains for both new and rebuilt equipment dealers. Last year marked the first time in this decade that sales increases were posted two years in a row. Results from both appear on page 32.

We at Rubber World would like extend our best to Marge Bauer and Don Brotzman, both recently retired. Bauer, the executive director of the Rubber Division, oversaw phenomenal growth and managed it expertly throughout her career which spanned three decades. The uniqueness of the Division's mostly volunteer set-up couldn't have made it easier for her, but there was rarely any criticism. And if you know the membership of the Division, that's an exemplary accomplishment. Brotzman served as president of the Rubber Manufacturers Association since 1981and served the industry well. He joined the RMA in 1977 in the midst of the Firestone 500 fiasco and ably handled rubber industry interests in Congress and in front of the regulatory agencies. The industry will miss these two and we would like to thank them for their assistance to us and to the industry. We wish for them, as Spock would say, to live long and prosper.

Don R. Smith
Editor

RubberWorld

EDITORIAL STAFF

Don R. Smith	editor
Dr. Walter C. Warner	technical editor
Jill Wrigley	managing editor
Julie Wagner	associate editor
Deanne Dodd	composition editor
Jon Menough	contributing technical service editor

BUSINESS STAFF

Job Lippincott	publisher
John W. Peto	v.p. sales
Dennis Kennelly	sales representative
Barbara Gordon	adv. production manager
Sally Dowling	assistant adv. production manager

EDITORIAL OFFICES

P.O. Box 5485
1867 W. Market Street
Akron, Ohio 44313
(216) 864-2122
Telex: 297690 RWMAG UR

OTHER LIPPINCOTT & PETO PUBLICATIONS

- Product News
- Automotive Polymers & Design
- Blue Book: Materials, Compounding Ingredients, and Machinery for Rubber

RUBBER WORLD, ISSN-0035-9572, July 1989 Vol. 200, No. 4.

Copyright: Lippincott & Peto, Inc. 1989; all rights reserved.

J.H. Lippincott, John W. Peto, owners. Published monthly with two special issues in February and August at 1867 West Market St., Akron, OH 44313 by Lippincott & Peto, Inc. Editorial and Executive Offices at 1867 West Market St., Akron, OH 44313. Second-Class postage paid at Akron, OH and at additional mailing offices. Postmaster: please send changes of address to RUBBER WORLD, Circulation Dept., P.O. Box 302, CromPond, NY 10517. Subscription Rates: United States, 1 year $27; Canada, $32; Foreign, $43 in U.S. currency by U.S. bank draft or international money order. Single copies $3.00. July 1989.

All rights reserved

Business Briefs

Chicago Boiler Co., CB Mills Division, appointed **Gerlach Industrial Sales** as representatives, responsible for the sales, service and promotion of vertical sand mills and horizontal media mills, in New Jersey, Eastern Pennsylvania, Delaware and New York.

Corporate, financial news

Akzo increased prices 5% for all grades of Trigonox EHP and Trigonox SBP peroxydicarbonate initiators. New delivered prices for orders of 500 lbs. or more become: Trigonox EHP-B75, $3.58/lb.; EHP-C75, $3.58/lb.; EHP-C70, $3.34/lb.; EHP-C40, $2.14/lb.; SBP, $5.44/lb.; SBP-C60, $3.58/lb.; SBP-C50, $2.98/lb.; SBP-C30, $1.88/lb. Akzo also increased prices of vanadium oxytrichloride for all shipments by $1.75 per pound, bringing the new list price for bulk and C-250 cylinder (3,000 pound) shipments to $7.30 and $7.55 per pound respectively.

Battelle Memorial Institute reported total revenues of $597 million from worldwide operations in 1988.

Bridgestone (U.S.A.) and parent company **Bridgestone Corp.** formally dedicated the site of its new U.S. radial truck tire plant in Warren County, TN. Bridgestone (U.S.A) also announced general price increases on its passenger, light truck, truck and bus, off-the-road, kart, agricultural and industrial tires, ranging from three to six percent, effective July 1.

Carlisle Companies recorded net earnings of $6.1 million on net sales of $143.1 million for the first quarter of 1989.

Degussa Group announced a turnover for the first half of the year of $6.9 million DM.

DSM reported first quarter sales in 1989 of Dfl. 2.8 billion and achieved an operating result of Dfl. 423 million.

GenCorp Automotive is reviewing alternatives to restructure its Toledo, Ohio-based automotive vinyl business because of a continuing industry-wide decline in demand and replacement of vinyl coated fabrics by the automotive industry, and a greater use of cloth, carpet and hard plastics and the gradual reduction in use of exterior landau vinyl.

GE Plastics dedicated its 96,000 sq. ft. Polymer Processing Development Center in Pittsfield, MA, in June.

Hoechst Celanese reorganized its corporate structure into five major business groups: Advanced materials, Advanced Technology, Chemicals, Fibers and Film, and Life Sciences.

Michelin Aircraft Tire Corp. (MATC) is moving its headquarters and R&D operations to Charlotte, NC, from Akron, OH, and will build a new headquarters facility and research center, expected to be operational by August of 1990. It will employ about 70 people.

Park-Ohio reported first quarter sales totaling $35.9 million and income from continuing operations of $558 thousand.

Polysar increased prices of nitrile rubber, excluding Tornac, by 10¢/lb. for medium grades and a minimum of 10¢/lb. for specialty grade products; polybutadiene rubber increased 3¢/lb., except for specialties which increased 5¢/lb.; and butyl rubber prices increased 7¢/lb. for Polysar Butyl 301 and 5¢/lb. for specialty and halobutyl rubber.

Wean Industries is filling an order, valued in excess of $1.5 million, for two twin breakdown mills and two twin final mills used in the manufacture of rubber stock for tire tread, to be installed in a new radial truck tire plant **Bridgestone** is building in Warren County, TN. The equipment is scheduled for delivery early in 1990.

RMA tire report - March
(figures in thousands of units)

Passenger tires	YTD '89	YTD '88	% change
Shipments			
original equipment	14,097	13,312	5.9
radial	12,286	11,337	8.4
replacement	34,128	34,184	-0.2
radial	32,294	31,859	1.4
export	3,435	2,625	30.8
radial	3,163	2,307	37.1
total	51,661	50,121	3.1
radial	47,742	45,503	4.9
Production	46,431	45,152	2.8
radial	43,017	40,732	5.6
Truck & bus tires			
Shipments			
original equipment	2,305	2,226	3.6
radial	1,907	1,633	16.8
replacement	8,342	7,861	6.1
radial	4,781	4,545	5.2
export	935	867	7.8
radial	702	683	2.8
total	11,583	10,955	5.7
radial	7,390	6,861	7.7
Production	10,285	9,525	8.0
radial	6,714	5,709	17.6

laboratory and consulting services for the rubber industry

MATERIAL IDENTIFICATION
ADDITIVES ANALYSIS
CHEMICAL THERMAL ANALYSIS
PHYSICAL MECHANICAL PROPERTIES
FAILURE ANALYSIS

L. J. BROUTMAN & ASSOC., LTD.
3424 SOUTH STATE STREET
CHICAGO, IL 60616 · 312 842-4100

broutman

Circle 7 on card

Machinery sales continue strong

The machinery suppliers to the rubber industry appear headed for their third straight year of sales increases. Results from *Rubber World's* annual survey of used and rebuilt machinery dealers coupled with a recently released study by Business Trend Analysts indicate the markets for new machinery as well as used and rebuilt should continue strong through the end of this year.

The BTA study, "The markets for plastics working and rubber working machinery," pegged the growth of sales for new rubber working machinery at 8% during 1987 and predicted that 1988 figures would increase 4.9% to $170.6 million. BTA, a Long Island, NY based market research firm, indicated that this would mark the first set of back-to-back yearly gains for the industry since the late 1970s.

Many times a sustained period of growth in sales of new equipment indicates a drop off in interest in used machinery, but *RWs* survey shows differently. 85% of the respondents indicated that sales increased in 1988 with 75% stating they expect further increases to be posted this year. Less than 3% said sales declined in 1988 and the same number predicted a decline for 1989.

Most of the suppliers of rebuilt machinery said there was strong demand for all rubber processing machinery. Presses, mixers, mills and extruders are the most requested pieces and the suppliers indicate that most equipment can readily be had with the exception of cold feed extruders and certain size presses.

Reflecting the capacity increases of the tire industry, the BTA report shows tire building machines accounting for one-third of sales of rubber machinery. Sales for tire building equipment should have reached $55.7 million in 1988, according to BTA. Sales in 1987 were $53.8 million. Tire-building equipment sales accounted for only 21% of machinery sales in 1977. Tire equipment sales have been a third of total rubber equip-

Figure 1 - sales of new rubber machinery ($ millions)

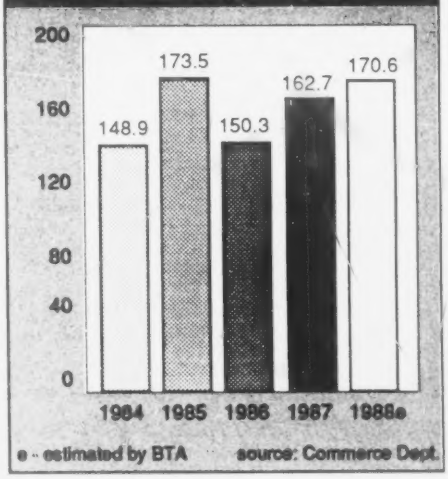


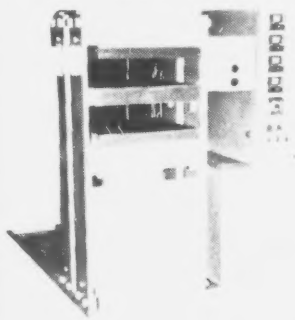
Table 1 - sales of new rubber machinery by type ($ millions)

	1972	*1977*	*1982*	*1987*	*1988e*
High-intensity solids mixers	*	8.5	9.2	10.1	11.3
Extruding machines	40.6	34.2	14.9	16.1	17.2
Tire-building equipment	21.6	34.0	60.0	53.8	55.7
Tire recapping and repairing machinery and equipment	11.9	11.1	29.0	22.3	23.5
Other rubberworking machinery, including calendering machines and vulcanizing presses	56.8	60.6	42.5	37.4	39.2
Parts for rubberworking machinery	NA	NA	24.5	18.2	19.0
Machinery not specified by kind	6.4	9.7	6.9	4.8	4.7
Total	$137.3	$158.1	$187.0	$162.7	$170.6

* - Included in "Other rubberworking machinery"
e - estimated by Business Trend Analysts
NA - Not avaliable

source: US Dept. of Commerce

— *INTRODUCING* —
ECONOMY LABORATORY PRESSES



SLAB SIDE DESIGN
8" x 8" to 30" x 30"
Platen Area.
Oil, Steam or Electrically
Heated Platens.
20 to 393 Ton.
Manual, Automatic
or
Process Controlled

WE MAKE
MOLDING
EASIER

ERIE MILL & PRESS CO. INC.
953 East 12th Street
P.O. Box 1364
Erie, PA 16512
(814) 454-1581

Circle 37 on card

ment sales for the last six years.

High intensity solid mixers are currently the fastest growing product category, increasing nearly 12% in 1988 to sales of $11.3 million. These mixers have shown a steady increase in growth since 1977.

Sales of extruders increased slightly last year, BTA estimates, to $17.2 million, which is almost half of what sales were in 1977 when sales reached $34.2 million. Imports of extrusion machines have been running high along with certain types of presses. The Society of the Plastics Industry petitioned the International Trade Commission to look into what they feel is dumping of injection molding machines.

Exports are still a strong part of the rebuilt market, as almost 90% of the rebuilders in the *RW* survey indicated they export rubber equipment. The average is 15.5% of the business, but three companies, Akron Tire Engineering and Machinery, Soberay and West Coast Rubber Machinery, bring the percentage up as exports account for 90%, 60% and 40% of their business respectively. Removing these three brings export sales down just under 10% for the rebuilders.

As in prior years, a directory of used and rebuilt rubber machinery suppliers follows, along with a grid on the capabilities of those companies that offer rebuilding services on pages 36 and 37.

Used, rebuilt machinery suppliers

The following directory lists the suppliers of used and rebuilt machinery to the rubber industry, with address, contact person and type(s) of machinery offered. Rebuilding capabilities are listed on the following two pages

Aaron Process Equipment Co.
Gerald Cohen
P.O. Box 530
Bensenville, IL 60106-0530
(312) 350-2200
Types of machinery: All types

Akron Tire Eng. & Mach. Co.
Erich Dorfner
Owner
P.O. Box 5397
Akron, OH 44313
(216) 867-8406
Types of machinery: All types

Alkar, Inc.
Jim Broch
President
1347 Middlebury Rd.
Kent, OH 44240
(216) 678-0822
Telefax 216-678-6018
Types of machinery: Rebuilders of all types, including presses, post inflators, mills, tire building presses, internal mixers, calenders, etc.

Armaco Ventures, Inc.
Charles Hall
President & General Manager
1920 S. Main St.
Akron, OH 44301
(216) 773-8218
Types of machinery: All types

Edwin H. Benz Co., Inc.
Edwin H. Benz, President
73 Maplehurst Ave.
Providence, RI 02908

- Window Splice Corner Molds
- Splice Molds
- Guaranteed Flash Free
- Extrusion Dies
- Injection Molds

Shapes and Profiles developed from Cross Sections, Drawings or 10 time scale sketches

- Computer Designed and Cut
- Hardened Pins and Bushings
- Helecoils in Aluminum Base
- Molds for Sivon Presses
- SMACO Splicing Molds

Write or Call for Brochure

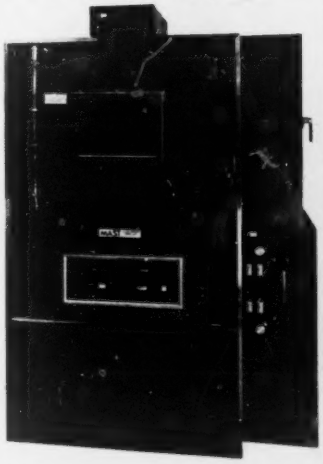
SQUARE DEAL
TOOL & DIE, INC.

1328 S. Main • Elkhart, IN 46516
Telephone (219) 295-5991
FAX 1-219-295-6765
TOLL FREE 1-800-999-7189

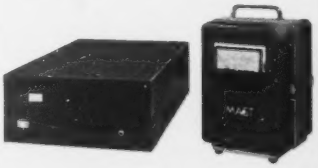
Circle 46 on card

MAST OZONE TEST CHAMBERS

fulfill ASTM D-1149, D-1171 equipment requirements



Series 700 Ozone Test Chambers have been field-proven in over 18 years service in rubber test labs throughout the world. New Model 700-10 offers many user convenience features including preassembled titration apparatus, circuit breaker protected control switches and automatic shutdown of ozone production when test compartment door is open. Chamber is designed to accept many user installed options such as our Dynamat rubber stretching apparatus and continuous ozone monitors.



UV Photometric Ozone Monitor — Amperometric Ozone Monitor

Convenient continuous ozone monitors give direct indication of chamber ozone concentration, operate up to 30 days unattended. Amperometric or UV absorption technique instruments give direct, continuous readout in ppm/vol ozone.

For immediate information, contact Gary Heitman.

(800) 553-8993

MAST DEVELOPMENT CO.

Air Monitoring Division
4673 Air Center Circle
Reno, Nevada 89502
(319) 326-0453

Circle 47 on card